Case Study on The Palapa Ring Project:

Prospects for Sub-National Competitiveness

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Abstract

The COVID-19 pandemic has increased the pace and extent of digitalization in economies all over the world. For emerging economies, such as Indonesia's, the largest obstacle is the lack of basic digital infrastructure. In 2019, Indonesia completed the Palapa Ring Project that sought to bring internet access to all parts of the archipelagic nation, especially the outermost regions. This paper uses the What-If simulation from ACI's Competitiveness Study, to study how the prospective improvements to digital access will affect the competitiveness of the 34 Indonesian provinces. The paper then corroborates the findings with the latest data on internet-related indicators from 2015-2020, to find that the provinces with the largest potential improvements after completion of the Palapa Ring have yet to be achieved. While individual internet access has increased, the internet has yet to be utilized in key aspects of life such as at work and school. The paper then looks to the national government's strategic plans for 2020-2024 to see how public institutions will address the identified gaps in digital uptake across Indonesia.

a) Overview

The Palapa Ring project was a national undertaking first floated in the 1990s and finally completed in late 2019. The project aims to build a fibre optic backbone network connecting all 34 provinces of Indonesia. In 2014, when the official presidential decree number 96 on Indonesia Broadband Plan was put in motion, the Ministry of Information and Communications (Kominfo) reported that the national percentage of households with internet access was just slightly over 32 percent (Kominfo 2014). Notably, all other regions apart from Java had recorded lower percentage of households with internet access, they are Maluku-Papua (16.46 percent); Bali-Nusa Tenggara (24.42 percent), Sumatra (28.36 percent), Sulawesi (30.33 percent) and Kalimantan (31.63 percent). ICT infrastructure, was evidently, one of the ways in which development had been unequally concentrated in the Java region. Responding to this gap, the Ministry of National Development and Planning had been tasked particularly to establish always-on internet connectivity with triple-play capability, resilient and secured information sharing, and broadband speeds of 2Mbps for fixed broadband and 1Mbps for mobile broadband.

The need for better ICT infrastructure Indonesia has been made more urgent by regional agreements as well. The master plan on ASEAN connectivity documented the regions' aspirations for integrations through many aspects, with digital innovation being a key scope of the ASEAN vision come 2025 (ASEAN 2016). Under the plan, disruptive technologies had been highlighted for their potential to draw some $220-625 billion in economic impact to the region. It was tabled that ASEAN member governments should see to the building of backbone infrastructures to make this a reality. Such a move would greatly ease the initial burdens faced by potential investors. In 2016, Indonesia had much ground to cover as it was ranked 105th by the World Economic Forum for its Infrastructure Readiness (World Economic Forum 2016). The implementation of the Palapa Ring project that took place in three geographical phases- Known as Palapa West, Center and East, executed over the period of 2017-2019, was a long-awaited move for Indonesians and international onlookers.

b) Simulating the potential impacts of The Palapa Ring Project on Sub-national competitiveness using the ACI Competitiveness Index

The following section seeks to corroborate the potential advantages that was expected of the Palapa Ring project with its performance on a sub-national level. This analysis uses ACI's competitiveness index that is made up of a unique set of indicators on socio-economic competitiveness at a more detailed provincial level. The framework of the index has also taken into account the role of technological infrastructure, under the environment on Quality of Life and Infrastructure Development. The indicators used for this simulation are:

4.2.02   Handphone Ownership
4.2.03   Desktop Ownership
4.2.04   Internet Access at Home
4.2.05   Internet Access at Office
4.2.06   Internet Access at School
4.2.07   Internet Access on Handphone

The simulation in this analysis uses the 2020 ACI Competitiveness Index, meaning hard data from 2017 and survey-based data from 2019. The rankings projected in Table 1 and 2 are therefore based on the provinces' progress in 2017, before the Palapa Ring Project was fully completed. Table 1 presents the results of the simulation on Overall Competitiveness Rankings and Table 2 presents the results for the simulation on the Quality of Life and Infrastructure Development (QLID) environment.

Table 1: 2020 Comparing Overall Ranking and Score Changes after simulating improvements to Internet Access

Province (In Ascending Order of Rank Changes)	Rank		Std. Score	
	Before	After	Before	After
North Maluku	32	28	-1.0839	-0.9891
Papua	29	26	-1.0552	-0.8554
West Sulawesi	31	28	-1.0635	-0.9706
North Sumatra	24	22	-0.6088	-0.3902
Maluku	28	26	-1.0495	-0.8841
Lampung	22	20	-0.3763	-0.2690
West Kalimantan	16	14	-0.0520	0.0211
Bangka Belitung Islands	30	28	-1.0584	-1.0182
East Nusa Tenggara	34	33	-1.3015	-1.1947
West Nusa Tenggara	17	16	-0.1483	-0.0449
West Sumatra	18	17	-0.1615	-0.0730
Riau Islands	11	10	0.3210	0.3884
South Sumatra	23	22	-0.4317	-0.3753
Central Sulawesi	27	26	-0.9475	-0.9165
Central Kalimantan	21	20	-0.3189	-0.2899
East Kalimantan	4	3	1.5908	1.6184
Southeast Sulawesi	19	18	-0.1688	-0.1508
West Papua	33	33	-1.2938	-1.1833
Jambi	14	14	-0.0154	0.0750
Riau	13	13	0.0932	0.1476
Bengkulu	25	25	-0.8363	-0.7921
Aceh	26	26	-0.9249	-0.8817
Gorontalo	20	20	-0.3114	-0.2770
Central Java	3	3	1.6118	1.6434
DKI Jakarta	1	1	2.6289	2.6545
North Kalimantan	8	8	0.5469	0.5664
South Sulawesi	15	15	-0.0396	-0.0205
East Java	2	2	2.2412	2.2591
West Java	5	5	1.5515	1.5669
South Kalimantan	12	12	0.2931	0.3078
Banten	7	7	0.6837	0.6932
North Sulawesi	10	10	0.3642	0.3673
Bali	6	6	0.9069	0.9069
DI Yogyakarta	9	9	0.4138	0.4138

Source: ACI.

Table 2: 2020 Comparing Ranking and Score Changes in QLID Environment after simulating improvements to Internet Access

| Province (In Ascending Order of Rank Changes)	Rank		Std. Score	
	Before	After	Before	After
North Sumatra	28	17	-0.7275	0.0128
Maluku	24	17	-0.5385	0.0315
Lampung	27	22	-0.6373	-0.2743
North Maluku	25	20	-0.5612	-0.2334
West Sulawesi	31	26	-0.9043	-0.5850
West Kalimantan	29	24	-0.7657	-0.5183
West Nusa Tenggara	20	17	-0.2350	0.1148
DKI Jakarta	9	6	0.7026	0.8047
North Kalimantan	10	7	0.7010	0.7670
West Sumatra	13	11	0.3702	0.6697
Riau	19	17	-0.0769	0.1072
Bangka Belitung Islands	30	28	-0.7999	-0.6605
Gorontalo	22	20	-0.2754	-0.1588
Central Sulawesi	26	24	-0.5941	-0.4877
South Sulawesi	14	12	0.3491	0.4137
West Papua	33	32	-1.5973	-1.2226
South Sumatra	23	22	-0.4619	-0.2708
Jambi	17	16	0.0098	0.1782
Bengkulu	21	20	-0.2554	-0.1035
Central Kalimantan	18	17	-0.0281	0.0703
East Java	7	6	0.7561	0.8242
Southeast Sulawesi	12	11	0.3813	0.4423
West Java	15	14	0.3090	0.3642
Papua	34	34	-3.2230	-2.5735
East Nusa Tenggara	32	32	-1.3054	-0.9385
Riau Islands	11	11	0.4290	0.6562
Aceh	16	16	0.1362	0.2863
Central Java	6	6	0.7737	0.8856
East Kalimantan	1	1	2.1296	2.2211
South Kalimantan	4	4	1.2768	1.3262
Banten	5	5	0.9022	0.9341
North Sulawesi	8	8	0.7042	0.7144
Bali	3	3	1.5180	1.5180
DI Yogyakarta	2	2	1.5381	1.5381

Source: ACI.

c) Discussion of Results: Connecting the Outermost Regions of Indonesia

From the Overall Ranking and Score changes presented in Table 1, it may be seen that the Palapa Ring Project has far-reaching benefits for Indonesia. With better internet access, a total of 32 provinces can expect to see an improvement in competitiveness. Upon a closer analysis, it may also be seen that 17 provinces will benefit more prominently, with ranking changes of one to four positions and score changes ranging from 0.018 to 0.0948. These 17 provinces are also notably provinces outside the region of Java, where economic development has been largely concentrated.

The Palapa Ring's particularly positive effect on the competitiveness of Indonesia's outermost region can be seen in Figure 1 that illustrates the geographical distribution of rank changes. The provinces with the top three improvements of four and three positions, North Maluku (32nd to 28th), Papua (29th to 26th) and West Sulawesi (31st to 28th) are three of the outermost regions in Indonesia, known historically to have been slow to benefit from the nation's development (Frankema & Marks 2010, Kurniawan et. al 2019).

Figure 1: Geographical Distribution of Improved Provinces (By degree of changes to Overall Rankings)

Source: ACI
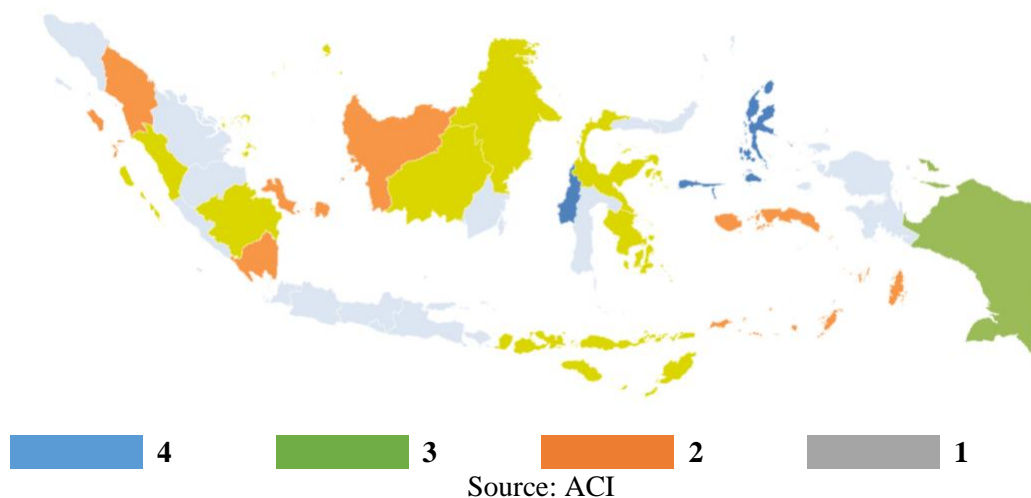
Provinces that did not show neither ranking nor score changes are also significant to the present case study. Out of 34 provinces, only two, namely DI Yogyakarta and Bali, did not see an improvement neither to their overall rankings nor their standardized scores. These two provinces are also notably two tourist hotspots. Their development as travel destinations would have motivated early development of internet access, for the comforts of prospective tourists (Law et al. 2016, Wijaya and Polina 2014).

ACI's four-environment framework allows us to look at provinces' strengths and weakness on a more detailed level. As the Palapa Ring Project namely targets each province's technological infrastructure, the simulation was also done for the QLID environment specifically (See Table 2).

A similar geographical pattern can be seen where most of the provinces seeing an improvement, top improvers, 20 out of 23 provinces to be exact, are from non-Java regions. The top three improving provinces are also from the outlying peripheries of Indonesia, such as North Sumatra (28th to 11th), Maluku (24th to 17th) and West Kalimantan (29th to 25th). The range of improvements in this environment range from one to 11 positions. This is a much wider range compared to the changes in overall rankings. This indicates that internet access has a large stake for provinces' performance in this environment.

Interestingly, an analysis on the environmental level shows that two provinces from Java, DKI Jakarta, West Java and East Java will still stand to gain from better internet access. The capital province can expect to improve by three rankings while the latter two provinces can improve by one rank each. From this, it may be inferred that despite the regions level of development, it has yet to enable its residents to harness the potential of internet access.

d) Harnessing the sub-national potential of Indonesia's new Internet infrastructure

Having illustrated the sub-national potential that may be derived from the development of the Palapa Ring, the following section assesses whether Indonesia's provinces have been experiencing the upward trajectory in internet uptake. The provinces of North Maluku and Papua have been chosen for this assessment as they have shown the greatest potential gain from an improved technological infrastructure. North Sumatra has been chosen as an example of a developed provincial economy that still has room for technological improvements.

The growth of the national GDP and the three province's Gross Regional Domestic Product (GRDP) is presented in Figure 2. Barring the global economic disruption caused by the COVID-19 pandemic in 2020, North Maluku experienced a steep increase in growth from 2016 to 2017 of 1.9 percent and continued to see an improvement up into 2018, albeit of a smaller magnitude of 0.3 percent. In 2019, it saw a sharp decrease that continued well into the year of the pandemic. Papua has been experiencing fluctuations in growth, with a peak of 9.14 percent in 2016 that was higher than all others, and a low of -15.75 percent in 2019 that was lowest among the four. The province's growth in the last six years illustrates the need for greater economic development that can be relied on in years to come.

Figure 2: GRDP/GDP Growth (Percent)
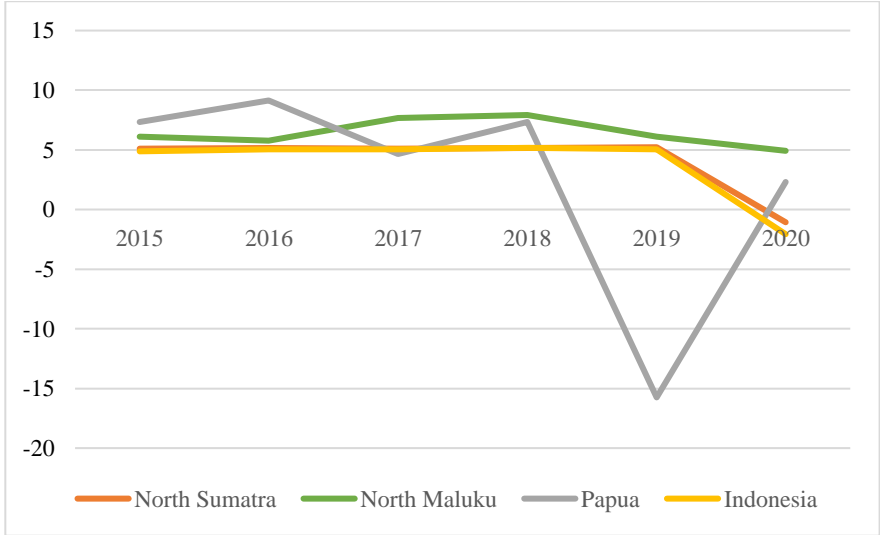
Source: BPS

The three province's progress from 2015-2020, on the six indicators used to assess Internet Access, are presented in Figure 3 and 4.

The national averages have also been plotted for comparison. While the present analysis is a preliminary overview of the provinces' internet development, internet use has been generally increasing over the years, across all the provinces in study. Notably, the percentage of the population with handphones (4.2.02) and internet access on handphones (4.2.07) have been increasing over the years, with a steep increase in 2019. Desktop Computer Ownership (4.2.03) however, has seen a gradual decrease since 2016. This indicates the growing preference for mobile and personal digital devices.

Figure 3: Increase in Individual Internet Access, 2015-2020 (Percent)

4.2.02 Handphone Ownership

4.2.03 Desktop Computer Ownership

4.2.07 Internet Access on Handphone
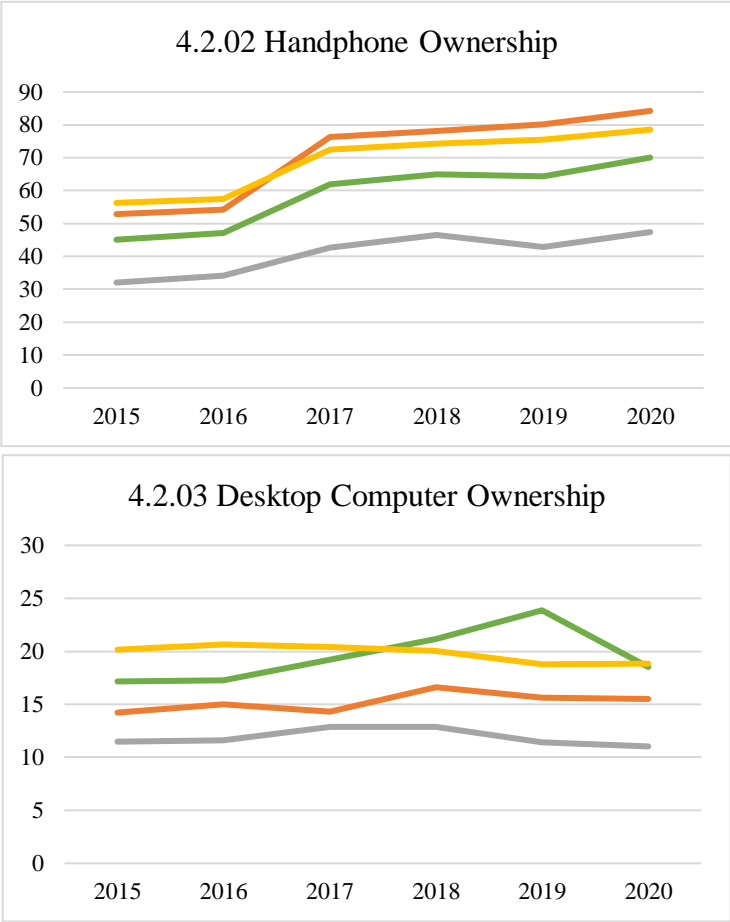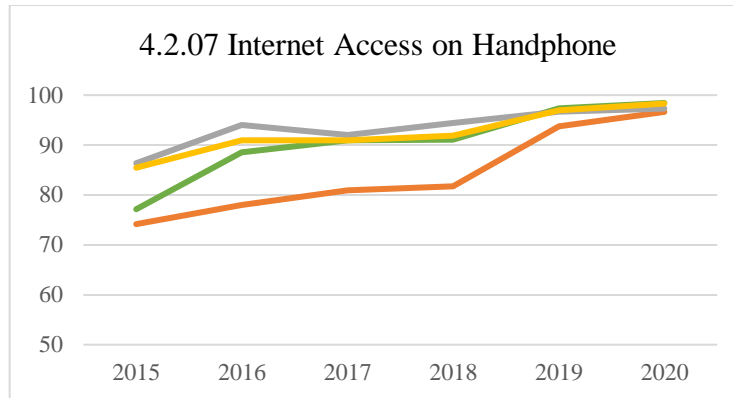
Source: BPS

Improvements to internet access in more shared settings like the home, schools and offices are not easy easily observed (See Figure 4). With Internet Access at Home (4.2.04), North Sumatra is steadily closing its gap with the national average, with a notable improvement from 2017. North Maluku and Papua on the other hand, have not experienced the same development. North Maluku has seen a gradual decrease in home internet access since 2017 and Papua saw a decrease from 2016-2019 before seeing a slight improvement in 2020.

For internet access at the office (4.2.05) the province has seen a steadily decreasing trend over the years. A synchronized dip can be observed in 2019 for the national average, Papua, and North Sumatra. Internet Access at School (4.2.06) has also seen an overall decrease. Aside from North Maluku, the national average, Papua, and North Sumatra have all seen a decrease since 2016. North Maluku experienced more fluctuations in this aspect, reaching peak internet access at schools of 27.12 percent in 2016.

The provinces' progress for internet access indicators in various social settings have not been as successful as indicators measuring the uptake of devices. This provides preliminary evidence that the Palapa Ring's effects were limited to personal digital consumption. Its impact has yet to visibly reach spaces of work and study, both of which provide the fundamental blocks for a province's digital preparedness. For the provinces in focus and to some extent, Indonesia as a whole, more digital harmonization is necessary. This might include for example, increasing internet access at the office before it can use digital tools to improve productivity at the workplace. Greater internet access in schools would also be required to increase the digital literacy of the next generation. Calls for greater synchronicity has also become more urgent during the pandemic. Digitally administered contingencies, like the Ministry of Education and Culture's initiatives in 2020 to provide free internet quotas for teachers and students (Kemendikbud 2020), remained out of reach for students in outer-most provinces (Yarrow et al. 2020).

Figure 4: Decreasing Internet Access in Shared Spaces, 2015-2020 (Percent)

4.2.04 Internet Access at Home*

4.2.05 Internet Access at Office*

4.2.06 Internet Access at School
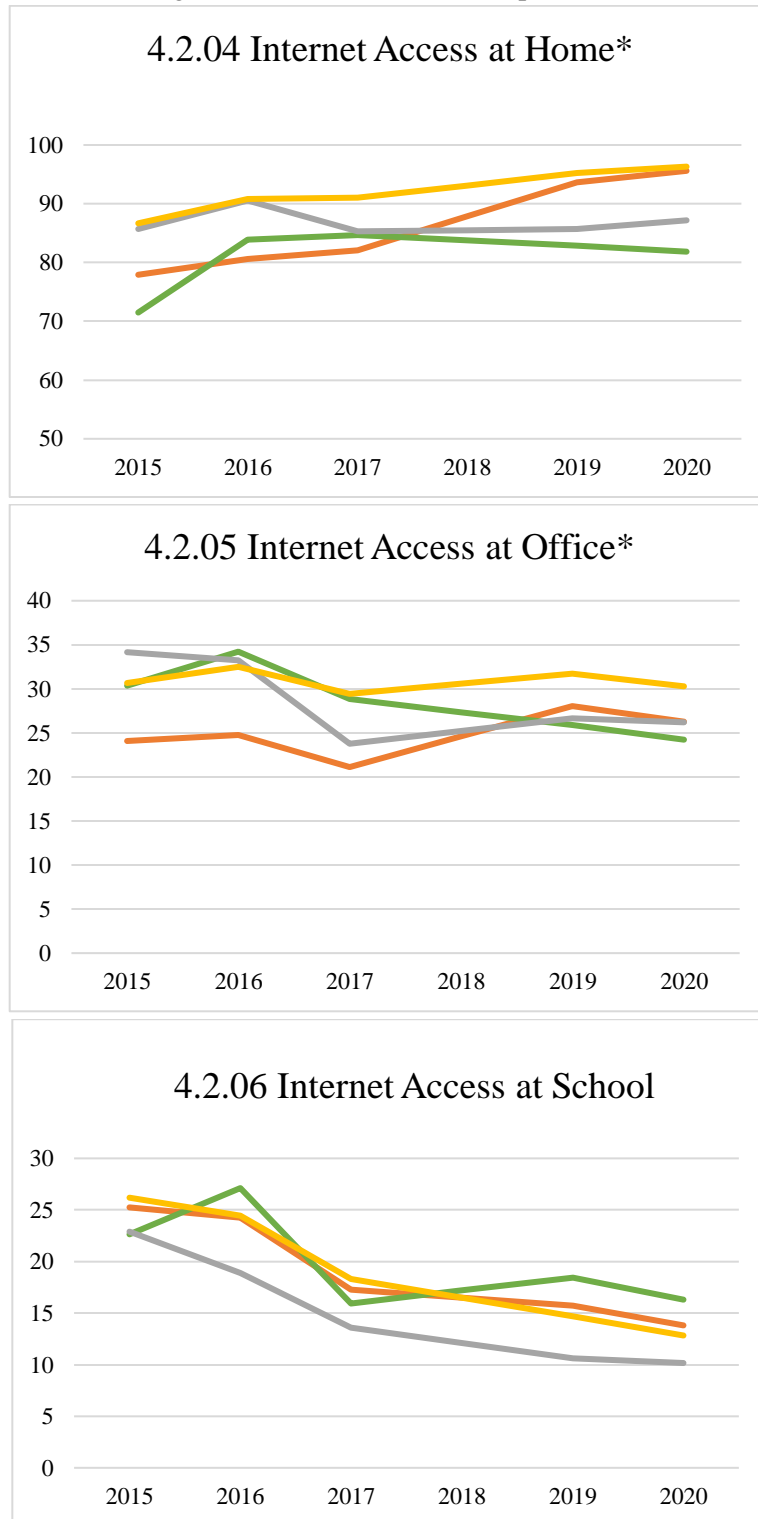
North Maluku   Papua   North Sumatra   Indonesia

* 2018 data was calculated using the average of 2017 and 2019 due to its unavailability.

Source: BPS

e) Plugging the gaps in Indonesia's Internet Infrastructure

The mixed performances from North Maluku, Papua, and North Sumatra on internet-related indicators, even after the completion of the Palapa Ring Project, warrants a more in-depth study to ascertain where the gaps in internet access and uptake lie for other outermost provinces. From the overview of internet access in contexts in this case study, a plausible explanation could be that internet usage is presently confined to the needs of the individual consumer. According to the e-Conomy Report by Temasek, Google and Bain & Company (2020), e-commerce and media are the leading sectors in 2020, growing by some 32 percent and 24 percent respectively. As the country charts its path towards an internet economy projected to record a gross merchandise value of US$124 billion by 2025 (Ibid.), more can be done, through public-private sector collaborations, to unleash its potential for workplace productivity and in preparing the next generation of technologically skilled labour for a digital future (Funfgeld 2019, Vineles 2017).

In specific policies such as the national government's strategic plans for 2020-2024, the government has acknowledged that while Palapa Ring has connected all provinces across the country, there is still much room for improvement at the level of villages. Out of a total of 83,218 villages under the government's purview, optic cable access has only reached 29,284 villages, or 36.0 percent (Ministry of Information and communications, 2021). This has continued to disproportionately exclude outermost regions that has a larger number of villages than administrations at a higher level (i.e. Regencies and Districts). For comparison, the ratio of city to village administration for the provinces in focus note some of the lowest in the country, indicating a high number of areas with populations that have not been reached by the Palapa Ring even when it was completed in 2019:

Table 3. Comparison of City and Village administrations in selected Indonesian Provinces

Province	Number of City administrations (2019)	Number of Village administrations (2019)	Percentage of city to village administrations (%)
North Maluku	10	1,081	0.92
Papua	29	5,549	0.52
North Sumatra	33	6,132	0.53
DKI Jakarta	6	267	2.25

Source: National and Provincial BPS, 2019

The following policy measures have been identified as key to taking the Palapa Ring Project closer to its ultimate goal of connecting the outermost regions of Indonesia:

- ***Finalizing regulations for Infrastructure Sharing among Telecommunication Companies***

Nonot Harsono, head of the Indonesia Telematics Society (MASTEL), a non-profit serving stakeholders in the ICT sector, notes that the under-utilization of the Palapa Ring is firstly due to the project's sole focus on building a "backbone" for internet access. He cites the need for a three-pronged approach to realizing enhanced internet accessibility: backbone, backhaul and access networks. The government's focus completing and maintaining the physical backbone, has led to lacklustre backhaul efforts. In an interview with news outlet Bisnis, Harsono highlighted that the second "backhaul" step till relies on private telecommunication companies in Indonesia to connect rural communities to the Palapa backbone.

The ICT white paper by MASTEL (2021) notes that the opportunity cost for telcos to build their own networks within untapped geographies have not been cost-productive and highly unsustainable. Sectoral players are anticipating a workaround that involves infrastructure sharing. MASTEL has projected that such a measure will enable companies will be able to increase their investment efficiency and operational costs

by some 40 percent through this measure. Currently, the official regulation from the central government to legalize this sectoral practice is the main obstacle in the private stakeholders' way. Without it, the private sector's development plans have been impeded by the pre-existing Universal Service Obligation that draws 1.25 percent of Gross Revenue, and the operation rights fee that imposes an additional 0.5 percent of Gross Revenue.

- *A whole-of-government approach to infrastructure development*

Apart from the operational incentives, industry onlookers have also suggested the need for greater guidance from the public sector, in terms of identifying districts and sub-districts in need of backhaul and access network construction by private telcos. In addition, Nonot Harsono has also noted the benefits of assigning geographical monopoly for interested telcos, such that they would have a greater ownership of internet development in the area. To do so, a review of the project's budgeting plans, most likely by the Telecommunications and Information Accessibility Agency (BAKTI) can reconsider the profit distributions of the public-private partnership schemes and assess the operational viability for telcos in the next phase of the project.

- *Building the private sector's confidence in government support*

Following the Omnibus Law on the Job Creation Act introduced in November 2020, the Digital Competitiveness Index 2021 by East Ventures has noted the private sector's optimism for even more partnerships with the government sector. Particularly, private sector players hope to assist President Jokowi's aspirations for national development through digitalization. Along with onlookers such as the Asian Development Bank (2019) and Frost and Sullivan (2018), there is a consensus that the red-tapes and the lack of cybersecurity stalled more private-sector funding. These ineluctable aspects of the technology sector will have to be addressed in the years to come. The National Data Center, set for a 2023 launch, has served to assure potential private partners of the returns and security in supporting Indonesia's digital future. In line with the equitable digital future that the Palapa Ring project first sought to achieve, the digital sector's key players should continue to look towards Indonesia's remote regions to elevate the country's digital development holistically and sustainably.

- *Enhancing and Harmonising Digital Literacy*

Beyond issues of physical accessibility of ICT infrastructure, the government has also recognized the ongoing gap in digital skills and literacy. Notably, The Human Resources Research and Development Agency is set to incrementally increase its non-tax revenues each fiscal year from 2020-2024, particularly in its training and outreach centres. The yearly non-tax revenue fiscal allocation for the Information and Communication Technology Training and Development Centers, for example, is set to increase three-fold from 2020 to 2024 (Ministry of Information and Communications, 2021). These centers will work with schools, community centres and talent programs to assimilate the digital into communal settings. Put together with the overall infrastructure push, the numbers reflect the government's efforts to increase the uptake of digital beyond the individual consumer. There is a valiant effort to build up the larger digital ecosystem in the country.

Given the large-scale digital projects that are to take place from 2020-2024, the government has also shown a keen interest in spurring greater public private partnerships in the ICT sector. To date, one of the most high-profile partnerships is the Online Academy established in conjunction with Microsoft and LinkedIn. After graduating its second batch, the tech giants have proceeded to target specific social areas such as education. With its "Training of Teachers" program, it has worked directly with educators from all over the

country on meaningful ways to incorporate digital tools in their teaching. These will in turn prepare the next generations for a digital world (Microsoft Indonesia, 2020).

f) Conclusion

Using Asia Competitiveness Institute's Competitiveness Index, this paper began by affirming the highly discussed potential of the Palapa Ring Project in Indonesia. Specifically, according to the *What-If* simulation conducted on the Index, it was found that indeed, the outermost regions of Indonesia has the greatest prospective gains in economic competitiveness. To assess the actualization of the project since its completion in 2019, the paper then used the relevant indicators to observe provincial and national trends from 2015 (before the project's budgeting and construction plans were finalised) to 2020 (latest available dataset). Internet uptake on the individual-level across provinces showed a subtle, but promising increase with the advent of greater connectivity. However, there remains much room for improvement, as internet capabilities and usage in shared spaces for work and school continued to fluctuate even after the project's completion. This is an issue that needs to be tackled should provincial economies decide to partake in the nation's digital revolution.

The final section went on to identify the potential reasons behind the continued gaps in internet connectivity across the country. Most salient is the fact that the outermost regions of Indonesia that have significantly higher village populations compared to that of cities. This has contributed to the under-utilisation of the project, as its target urban demography focused on cities across Indonesia's provinces. To tackle this issue, the paper provided an overview of policy measures that will increase the project's penetration rate to the more detailed village-levels. Reorienting the Palapa Ring Project's objectives and execution plans will involve greater public-private partnerships that characterize a healthy ICT sector. Collectively, these measures will stand Indonesia in good stead as it partakes in the global digital revolution.

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